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A BIG ANSWER FOR PUBLIC EDUCATION: SMALL SCHOOLS

BY SARA MOSLE

Photograph by Carrie Boretz for The New York Times

Small is the answer – if there are ample funds and outsized talent. A concrete example is School for the Physical City, where students and teachers are breaking down apathy, bureaucracy and alienation. **By Sara Mosle**

JOSEPH NEWKIRK LOOKED LIKE SPIDERMAN. HE WAS clinging to the cyclone fence surrounding the playground at Intermediate School 70 on West 17th Street in Manhattan. His tie whipped his face in the breeze. Far below, his students egged on their superhero: "You can do it, Mr. Newkirk!" and "You've almost got it now-w-w-w!" The string he was clutching made it look as if he were actually spinning a web. It rose to the top of the fence, slipped down through the bare branches of the tree, dipped and ascended again, and finally halted where the kite had become ensnared in the fire escape of an adjoining building.

Newkirk pulled; the kite wagged its tail. "Oooh! Careful!" cried several kids below. The students had built the kite in Newkirk's middle-school science class at the School for the Physical City, a new public school in its second year in Manhattan, and they didn't want to see their latest test model destroyed. Across the playground, kites of all shapes and sizes floated like clouds above the cement plain. Below, clumps of students shadowed their movements and recorded data on clipboards.

The students, most of them barely teenagers, wore the standard uniforms of stylish urban grunge — baggy jeans, T-shirts, flannel work shirts, baseball caps, boots, sneakers. Their parents had chosen to send them to S.P.C., as it's called, instead of their regular neighborhood schools, as part of a foundling citywide "choice" program initiated by Joseph A. Fernandez in 1992, when he was School Chancellor. The students, from mostly lower- and middle-income families, come from all over the city. Although there are slightly more boys than girls, the kids otherwise represent an ideal cross-section of the city's student population. By ideal, I mean

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Sara Mosle is a staff writer at The New Yorker and runs an after-school program at P.S. 128.

The City as Classroom *Mark Weiss, the principal at S.P.C., with students at a Manhattan playground.*

Small Schools

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more integrated: African-Americans, Latinos and whites each constitute somewhat less than a third; the remaining 15 percent or so are Asian. The students could have walked straight out of one of those multicultural Benetton ads.

Newkirk's students were conducting an experiment, and they are part of one too. The School for the Physical City is just one of 50 new public schools that have opened in New York City in the last two years. Fernandez pushed for their creation before being ousted in 1993. They are organized around a variety of themes and pedagogical philosophies. Their unwieldy names announce their missions: the High School for Health Professions and Human Services, El Puente Academy for Peace and Justice, the Kingsborough Academy of Sciences High School. Each of them, though, might be called the Smaller School of Smaller Classes, for that is their chief, shared, revolutionary idea.

Although all of the schools fall under the auspices of the city's central Board of Education, most of these new schools have been given private dollars. (Already $8.5 million has been raised from three organizations — Time Warner, the Aaron Diamond Foundation and the Charles Hayden Foundation.) Among educators, Annenberg's name is constantly being invoked, as in "When Annenberg comes..." and "When Annenberg gets here..." and "Now that Annenberg is here." You'd think Godot had finally arrived.

Annenberg's money has provided a desperately needed infusion of hope into the city's beleaguered public school system. But as great as his gift may seem, it's dwarfed by the city's annual $8 *billion* education budget and doesn't begin to make up for recent cutbacks. Because of the ongoing fiscal crisis in New York, some $540 million has been cut from the city's schools in the last year alone, and an additional $750 million may be slashed even before classes begin in the fall — more than $1 billion total. All of this comes at a time of steeply rising enrollments. A new demographic bulge, the baby boomers' children, has just entered grade school.

In New York, this influx has been

The AV Squad *Sam Schwartz and a student check out traffic radar equipment.*

crucial support from several local nonprofit groups that last year received the first "Annenberg grants." These much-coveted awards come from the philanthropist Walter K. Annenberg, who pledged $500 million in December 1993 to help reform public school systems nationwide. Over the next five years, New York City will receive some $50 million, to be matched 2 to 1 by both public and

compounded by a huge increase in immigration. In New York City, for instance, the total number of students in the last two years has topped one million. And the number is expected to rise by some 20,000 students annually well into the 21st century. Overcrowding is rampant, with classes held in hallways, cafeterias, auditoriums, closets and even some lavatories. School facilities, most of them built before the Depression, are falling apart. But because of the city's budget crunch, a capital improvement campaign has essentially been abandoned. Some of the city's neighborhood high schools resemble anonymous factories, with upward of 4,000 students each. Production, one might say, is at a standstill: only half of the city's entering freshmen typically graduate in four years.

Can smaller schools and smaller classes really transform a school system beset by so many other problems? And if they can, are we willing to pay for them? The story of the School for the Physical City is instructive of some of the difficulties inherent in what might be called, for lack of a better term, "school-raising." S.P.C. has already been subject to as many influences — fiscal, parental, political, pedagogical and philanthropic — as the most impressionable adolescent; and, like many new schools, it may be neglected or even abandoned before it's full grown. The story is a little like "Bringing Up Baby," the 30's comedy about raising a leopard, and the plot twists are as frequent. To the extent that all successful schools resemble one another, it's also the story of a school-reform movement.

MARK WEISS'S TYPICAL school day begins when his digital alarm goes off at 4:48 A.M. Weiss, the principal of S.P.C., gets up and takes his dog for a walk outside his home in Peekskill, N.Y., about an hour's drive north of Manhattan. By 5:25 A.M. he's in his car barreling south on the Henry Hudson Parkway toward S.P.C. in the dark.

At 49, Mark looks a little like Santa Claus in civvies. He has white hair, a white beard, pink cheeks and twinkly eyes. He isn't fat like Santa, but is just as jolly, even so early in the morning. For the previous 24 hours, I'd been shadowing my subject and was feeling a little bleary-eyed. We left the school around 6 the night before and arrived at Weiss's home just before 7:30. He didn't get out of the car. His wife and daughter got in. Together we drove to his daughter's open-school night at her suburban public high school — a sprawling state-of-the-art facility that lighted up the night sky like Cape Canaveral before a midnight launch. The art rooms alone consist of a drafting area, a pottery studio with full-size kiln, a photo lab and darkroom, and a space set up with easels for painting or drawing.

Mark seemed untroubled by the inequities between his daughter's school and his own. Like a former star quarterback in the sky box, he offered a running commentary on the parent-teacher play-by-play. By 9:30, the family was back home, and by 10 Weiss and his wife were in bed. This was a late night. From the guest room I could hear his daughter tiptoeing around. In a touching reversal of roles, she was trying not to wake her slumbering parents.

Mark, as even his students call him, likes getting to the office early to enjoy a moment of peace and quiet, to make a few phone calls and to get a pot of coffee going for his teachers. They start to stream in around 7 A.M. The School for the Physical City doesn't actually *have* a physical school in the city — at least not yet. Like most of the new schools, it consists of a few fugitive classrooms inside the leviathan brick hull of I.S. 70 in the Chelsea section of Manhattan. Although S.P.C. will move into a newly renovated building in the fall, it is almost the sole exception among the new schools in having acquired permanent housing.

Finding S.P.C.'s quarters inside the larger building isn't easy. You don't walk "into" the school: its classrooms are scattered across two floors. Mark's office isn't really an office, but a large classroom that also serves as a teachers' lounge, conference room, nurse's office, storage closet, Xerox room, reception area and general place to hang out — a kind of TV room without the TV. Kids camp out on the large sofa installed against one wall. They gos-

PHOTOGRAPHS BY CARRIE BORETZ FOR THE NEW YORK TIMES

Habitat for Humanities *The round-table size of classes at the School for the Physical City has given hope to teachers like Joel Barsky, whose previous school had 4,000 students.*

sip with each other, do their homework, give passing teachers a hard time, chew on their hair. The teachers, for their part, give as good as they get. They sit around a large table that stands at the room's center both literally and metaphorically, where the entire staff gathers to discuss everything from that day's field trip to the direction of the school. If the school can be said to exist in any one place at all it's in this classroom up on the second floor.

IN APRIL 1992 MARK WEISS WAS having lunch with his old friend Sam Schwartz at a Thai restaurant on Ninth Avenue when they came up with the idea for S.P.C.. The two first met at the Nixon Impeachment Coalition in Brooklyn in 1972. "If it weren't for Richard Nixon, this school wouldn't exist today," Schwartz likes to say. Schwartz is perhaps best known to the public as "Gridlock Sam" — he coined the term "gridlock" when he was the city's traffic commissioner in the 80's. He's now the director of the Infrastructure Institute at the Cooper Union for the Advancement of Science and Art in New York. As he recalled, "I was bemoaning how most of the city's infrastructure professionals" — urban planners, tunnel inspectors, civil engineers — "didn't come from New York City, much less the city's public schools, and I wanted to find a way to interest city kids in their own environment." Mark, not surprisingly, thought of starting a school.

At the time, Weiss was director of instruction and professional development at the Office of Alternative High Schools at the Board of Education. He grew up in Flatbush, attended the neighborhood public schools and went to Brooklyn College in the mid-1960's. He was a student radical. (He met his future wife at an antiwar meeting and still refers, only half-jokingly, to "the revolution.") He began his career in 1967 by returning to teach at his alma mater, Brooklyn Technical High School, and has worked ever since in the city's public schools — as a teacher, a principal, a union delegate, and even a Board of Education bureaucrat.

From 1979 to 1991, Weiss was the founding principal of Bronx Regional, a small, successful "alternative" high school in the South Bronx for kids who weren't succeeding, for one reason or another, in the city's regular public schools. As Mark later put it: "Sam didn't understand that people like *us* could start a public school. He thought it was something that only the Board of Ed could do." As the two friends talked, they began to imagine a junior-high and high school that would use the city as an extended classroom for hands-on projects that might motivate kids and become a springboard for introducing more traditional subjects in science, math, history and language arts.

Weiss knew that if they wanted to create a really good school, they'd have to find outside money. Nowhere, perhaps, are public schools more complicated than in how they are financed. They're cobbled together by various scraps of Federal, state, city and philanthropic funds, most of which come with strings attached. Many schools have what's known as "grant writing" committees that send out mass mailings, which resemble direct-mail campaigns, to raise money. Once pieced together, however, these unrelated programs often don't make any sense, which is one reason why the design of so many public schools — dictated by necessity rather than reason — is so peculiar.

Schwartz approached the New York City Mission Society, the city's oldest charitable organization, which agreed to devise the school's parental-outreach programs. He also teamed up with John Jay Iselin, president of Cooper Union. In many ways, Cooper was the ideal partner. The college was established in 1859 by the industrialist and inventor Peter Cooper to provide educational opportunities for the city's working poor. Today Cooper Union is the only private, tuition-free college of its caliber in the country. It operates on a shoestring and is everything that Weiss and Schwartz hoped their own school would be: rigorous, diverse and, most important, free.

Together, Weiss and his partners applied for and received a "planning grant" from the Fund for New York

Common Ground *Joseph Newkirk rubs elbows with students in the principal's office, which is also a teachers' lounge, nurse's office, storage closet and hangout spot.*

City Public Education to establish one of its 16 "New Vision" Schools. Founded in 1989, the fund is one of the groups receiving the Annenberg money. It functions a little like a Ouija board — channeling the disparate and mysterious forces of the Board of Ed, the United Federation of Teachers, community organizations, individual educators, foundations and philanthropists into sensible and clearly articulated reforms. "You need an independent group to mediate, to push things, to negotiate hard, to provide some accountability," explained Naomi Barber, the fund's New Visions project director. "People talk to us because we don't have a political stake in being aligned with any particular group. And we bring the private sector to the table."

In July 1992 Weiss went on a weeklong rafting trip on the Green River in Colorado. The trip was hosted by the Harvard Outward Bound Project to bring educational leaders together to discuss school reform. One of the participants was Meg Campbell, co-director of Outward Bound's expeditionary learning center at Harvard's graduate school of education. The first night there was a torrential downpour. They huddled under their tarps on the banks of the Green River. Out of the dark a National Park Ranger emerged with a message: Outward Bound had won a grant from the New American Schools Development Corporation to create several "expeditionary learning centers" throughout the United States.

Over campfires, the group discussed its plans. "An Outward Bound course is a very accelerated method of finding out a great deal about a person," Campbell recalled. "You find out if they're really workers, or if they just paddle a little bit on top of the water. It told me a lot about Mark's backbone, his patience and tenacity and his remarkable gift of humor." Partly because of what Campbell learned, Outward Bound picked the School for the Physical City as one of its first expeditionary learning centers.

The educators eventually rafted 45 miles down Disaster Falls, Hell's Half Mile and Triplet Falls. But for Weiss, starting his new school was to be the real River Wild. Its name alone gives one pause. The school's letterhead now reads:

School for the Physical City, An Expeditionary Learning Center, a New Visions/New American Schools Development Corporation Partnership with the Cooper Union for the Advancement of Science and Art, the Infrastructure Institute at Cooper Union, the New York City Mission Society, New York City Outward Bound, Outward Bound USA, a collaboration of Community School District 2 and the Division of High Schools' Office of Alternative High Schools and Programs.

A public school is the educational equivalent of Grand Central Terminal: all of these lines intersect in the physical place called "school." That Weiss has been able to keep all of the competing interests from colliding and on track is a testament to his fund-raising abilities, his general political savviness and his considerable powers of persuasion. But this elongated title also suggests the difficulty in duplicating S.P.C.'s potential success, which at least partly depends on coming up with the kind of private resources that Weiss, with his unique talents, has been able to marshal. And even he can't do it all. As Campbell noted: "The tug is between outside demands on Mark's time, in terms of fund-raising and resource mobilization — just being married to all those different partners, all of whom want him to come to their board meetings and their galas — balanced against the knowledge that the school is really about teaching and learning and the students' work."

TWO DAYS BEFORE CLASSES were to begin last fall, Weiss was still having to scare up some furniture and other basic supplies. His nine-person teaching staff had even begun eyeing the 20-foot pile of trash in the school's courtyard — rusted upturned desks, broken chairs, rotting books — that sat waiting to be hauled off by sanitation officials. It looked like the barricade in the musical of "Les Misérables." His teachers, however, were relatively

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'Sam didn't understand that people like us could start a public school. He thought it was something that only the Board of Ed could do.'

unconcerned by the material deprivation, which, after all, is commonplace in the city's schools. For the previous half-hour, they had been debating a far more pressing issue: What to do with Lydia?

The discussion was unusual not least for its occurring at all. In most of the city's public schools, teachers were just returning for the first time since June. Because principals have to wait to see who returns before making final staffing decisions, many teachers don't know whom or even what they will be teaching until weeks after classes have begun. The lucky ones receive computer-generated lists of their students' names and vital statistics: ID numbers, dates of birth, how well they did on the previous year's citywide reading and math tests. But it's usually something of a minor miracle if they have stories to go with any of their new students' faces or names. As one S.P.C. teacher described her old school: "There wouldn't be room keys. There wouldn't be class lists. It would be so disorganized, and it would be October."

At S.P.C., however, teachers seemed to know everything about their students' lives. Like coaches on draft day, they had been swapping students to try to assemble the best teams:

Teacher No. 1: How about trading your three sixth graders for my three seventh graders?

Teacher No. 2: But I can't put Lydia and Joseph together.

No. 1: Lydia was out for two months last year.

No. 2: Her sister ran away and her mother died.

No. 1: O.K. How about Jackie and Justine switch.

No. 2: Then we could put Lydia with Kenya.

No. 1: Also, Forrest's parents want him to have the same teacher.

Teacher No. 3: O.K., I'll take him.

This personal approach is really at the heart of the School for the Physical City. What makes S.P.C. different from so many other public schools in New York is not so much its hands-on curriculum, progressive as it is, but its size, from which everything else follows. In most junior-high and high schools in New York, teachers regularly see as many as 180 students a day in classes of 34 students, the legal limit. At S.P.C., however, there are fewer than 180 kids in the whole school and no class has more than 20 students.

I know from my own experience teaching for three years at two different public schools in upper Manhattan how important school size and class size are. Both of my elementary schools had more than 1,500 students in facilities originally built for roughly half that many, and I had anywhere from 30 to 34 students in my third- and fourth-grade classes. It seems silly to have to say it, but that's way too many kids. Every once in a while, when a snowstorm would keep half the class at home, I'd get a taste of what teaching might be like at a tony private school. Suddenly, all my difficulties in the classroom would evaporate. I instantly saw how the School for the Physical City could work.

Smaller classes unleash a kind of domino effect of reforms in a school. With fewer students, teachers can devote more time to their lessons. They can give more complicated assignments and spend more time correcting them. They can know students individually and follow their social and academic progress closely, without having to rely on crude, standardized means of assessment. They can communicate more effectively with parents. And, because the school's staff is so small, it can sit around a table, like that in Mark's office, and make decisions about the shape and design of the school, instead of getting caught up in the bureaucracy. Is it any wonder, then, that smaller classes have long been the chief pedagogical tool of most private and parochial schools?

If this all sounds stunningly common-sensical, it is. Yet it took a visionary to see the need for such reforms and to make them happen. The reform movement known as Smaller Schools of Smaller Classes began 20 years ago with one of those incidents that at the time seems like nothing at all but that, one later realizes, was the precipitating event of a revolution.

In the spring of 1974, Anthony Alvarado, then a new, reform-minded superintendent in District 4 in East Harlem, asked a woman named Deborah Meier if she wanted to start her own school. At the time, Meier was just another schoolteacher frustrated by the system. Alvarado couldn't offer her much, just a few classrooms inside another building. She'd have to recruit her own students. (This was billed as giving parents "choice.") She began unceremoniously with six teachers, one assistant and fewer than 100 students: "I said, 'Let's have smaller classes and put everyone in the classroom,' and I got an answering machine to take care of the office."

At the time, "choice" wasn't the buzzword it is today. It simply provided Alvarado and Meier with a certain amount of political cover. If parents didn't like the school, they were free to take their kids elsewhere. In return, Alvarado gave Meier virtual autonomy over curriculum and hiring decisions. Such freedom was against union and Board of Ed rules at the time, but Meier encountered little opposition at first. Frankly, no one cared what she was up to.

Meier's success is now legendary. (She went on to win a MacArthur Award, the so-called "genius grant," for her work in the district.) Central Park East, the school she started, has spawned dozens of similarly small "choice" schools in the city. The essence of her reforms was a single idea, what might be called her 20-20 vision for reform. She explained: "Not only is 20 the maximum workable number of students in a class. It's also the largest workable number of teachers in a school. Ideally, no school should have more than 400 students." Research has since backed up her assumption. A recent study by the American Legislative Exchange Council, an association of state lawmakers, found that a school's size is even more important in determining the performance of students on nationwide tests (like the S.A.T.) than the amount spent per pupil.

Unlike many other school-reform movements, however, in which theory dictates practice, Meier's ideas had arisen from years of experience in the classroom. She eventually teamed up with Theodore Sizer, who is the director of the Annenberg Institute for School Reform at Brown University. It's largely because of their association that New York City received the first of the Annenberg money.

She also began to proselytize about her reforms in Dissent, the quarterly founded by the late democratic socialist Irving Howe, and in The Nation, probably the country's best-known liberal weekly. Weiss remarked: "She has always been interested in education for education's sake. In the 1960's, Debbie was al-

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Aeronautics 101 *A course in kite-building got students working out in the field.*

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ready worried about assessment" — that is, improved means of measuring students' academic progress. "In the 1960's, I couldn't have cared less about assessment. Debbie's understanding of the whole tradition from Dewey on has been so important. You need someone like her to frame the issues for the American people."

S.P.C. HAS ACHIEVED ITS smaller classes, as Meier did, largely by putting all of its teachers in the classroom — a reform impossible to duplicate in the city's more overcrowded schools. The overall student-to-teacher ratio in New York is actually close to what it is in a lot of private and parochial schools: about 15 to 1. But many teachers in the city hold what are known as "out of classroom" positions: curriculum coordinators, staff developers, resource or special-ed instructors who provide individual instruction in reading or math.

Mark told me that he would never have started S.P.C. if he hadn't been able to select his own staff. As he put it: "Your teachers *are* your school." His teachers felt similarly about their principal. As Joel Barsky, a middle-school humanities teacher explained: "School size and all that is important, but Mark is a big part of the success here. A *big* part. Every teacher who's here *chose* to be here. That's powerful."

Everyone I spoke to gave credit to the United Federation of Teachers president, Sandra Feldman, for introducing what's now known as the "school-based option," whereby teachers can vote to allow their schools to select their staff, regardless of seniority. The move wasn't popular among much of Feldman's membership, and she had to fight to make it happen. She's eloquent in its defense: "In a small school in which teachers have been working with each other to create something from the ground up, they really need to have a camaraderie and agreed-upon philosophy of education. And if you create a school where the teachers are truly involved in decision-making, including on personnel issues, that's a trade-off for a straightforward seniority system, which *is* appropriate and needed in a factory-model system."

S.P.C.'s teachers described the school as a kind of life preserver tossed to them. They were drowning at their former schools. Joel Barsky, for instance, worked for four years at Julia Richman, a troubled high school with some 4,000 students that is in the process of being broken up into several of the city's smaller new schools-within-a-school by the Center for Collaborative Education and the Board of Education. He recalled: "The kids were fine. I mean, kids are the same everywhere. The adults were why that school was failing. People had been there 20 years. They were hanging on for dear life. There were teachers there who did nothing. It was unbelievable. I've never seen such despair in children."

Leo Owen, a middle-school math teacher at S.P.C., agreed. Owen immigrated to this country from Guyana in 1983, and became a citizen last year. He has a soft voice, and speaks with a clipped accent. He had taught for nearly 10 years at two different intermediate schools in Brooklyn that had nearly 2,000 students each. He said: "When I entered my first day in a classroom, kids were doing somersaults. I consulted a colleague who said, 'If you're teaching 2 to 3 percent of your students, then you are doing well.' I set very high standards; I lowered my standards. I would tell this to people, and they would say: 'So? You're getting a salary, are you not?' So I used to say to these people: 'Yes, but I have not earned my salary. I am forced to accept a salary under false pretenses.' This," he remarked with characteristic understatement, "did not make me very popular with my colleagues."

One on One *Lisa Jacobson, S.P.C.'s art teacher, works on a mural with Sherman Barr, an eighth grader.*

About the virtues of S.P.C., however, Leo was glad to testify: "I am happy because of Mark. His administrative style is exactly what mine would be. I work to try to make his vision happen. It makes me happy to fulfill it. He comes up and says, 'You're doing a good job.' That makes me happy. I am happy because of my colleagues. I can tell them even when they are rubbing me the wrong way, and they can tell me. I am happy because of the children. I know I am going to be able to do certain things with them. I'm happy because of the parents, who will talk to me about their children, volunteer information about them. For the first time, I feel as though I'm earning my salary."

S.P.C.'s whole structure, from its borrowed space to its schedule, is literally a page from Deborah Meier's new book, "The Power of Their Ideas." She writes of Central Park East: "We decided on the simplest of schedules: two hours each day in humanities (art, history, literature, social studies), two hours daily of math and science and one hour of advisory" — meetings in small groups with teachers. S.P.C.'s schedule is similarly divided into two 90-minute periods, one in the morning and one in the afternoon. To the middle of the day, Weiss has added a few electives: French, poetry and tutorials in English and math. The big blocks of time have allowed teachers to team teach, to take field trips and to conduct long experiments.

Last fall, for instance, the middle school studied "activists," a thematic unit in their humanities classes, which covered everything from the Civil War to the fall of Communism. Students read Frederick Douglass, visited homeless shelters, looked at graffiti around town and then, with the guidance of the arts teacher, Lisa Jacobson, designed their own murals. They painted slogans on wide swaths of butcher paper in the hallways. This in turn became the springboard for a writing assignment in which students composed personal statements about themselves and their own beliefs. No lesson was ever just an isolated exercise, but was integrated with whatever else the kids were learning in their other subjects. Throughout, kids were learning about the city, its history, and how to improve their physical and social environment. At one point, Sam Schwartz even gave a guest lecture on being an "infrastructure activist."

A typical day in Edi Juricic's middle-school class, for instance, began with students sitting in a semicircle and talking about the chapters they read the night before in "Black Boy" by Richard Wright. Juricic solicited descriptions of the Jim Crow laws described by Wright, and students discussed their effect. He then moved into a discussion of Reconstruction, and of the Supreme Court decision Plessy v. Ferguson. Kids talked about how to amend the Constitution. Class ended with kids writing in their journals. The period had been a nice mix of history, literature and the law.

It would be wrong, however, to read too much significance into this interdisciplinary way of doing things. For one, the classes aren't that different from many others I've witnessed. The approach isn't *so* newfangled. Some teachers, who seemed less comfortable with this method, were a little more traditional.

What was different was the smallness. Kids took notes, wrote stories, kept journals, composed essays — except that now their work received more attention. Discipline problems still arose, but instead of 10 kids disrupting a class of 30, rendering it virtually unteachable, 4 or 5 kids might be snickering in a class of 20. Teachers still struggled, but not as much.

One of the best teachers at S.P.C. is probably Joseph Newkirk, a former mechanical engineer whom Weiss hired on a hunch even though he had no experience in the classroom. In mid-career, Newkirk is one of the five African-American or Guyanan people on staff. He's something of a dapper dresser, given to brightly colored shirts and ties and a brown suede fedora. He has a gray speckled beard, which he

PHOTOGRAPH BY CARRIE BORETZ FOR THE NEW YORK TIMES

rubs when he's thinking, and wide eyes, and the demeanor of someone who has seen it all. For three months, his class built kites as part of a semester-long unit on "Kites in the Wind: How Do They Fly?" Around this ongoing project, Newkirk wove lessons on everything from the molecular content of the atmosphere to the basic principles of aerodynamics to how to write up a formal lab report. Kids built models of their designs. They then field-tested their kites in the school's playground, wrote up what they'd learned and revised their models, building ever bigger and more complex versions.

The day before Christmas vacation last fall, Newkirk's students took their finished projects to Hudson River Park for their maiden flights. They trundled down to the waterfront, dragging their brightly colored kites behind them. Before the flights began, Newkirk gathered his students together to review what they had learned throughout the semester. Kids recited different design principles: "If your kite is narrow, it's easy to get up, but hard to control, but if it's wide, it's hard to get up, and easy to control." They discussed area and aspect ratios. One kid showed me how to determine the kite's height once airborne by calculating the angles with a protractor. Another kid talked knowingly about Bernoulli's principle, which explains the lift produced by a wing having a curved upper surface and flat lower surface. Children's cries filled the park: "Yes, Yes, YES" as one kite finally made it aloft, and "No-o-o-o-o!" as another took a nose dive. All the while, Newkirk ran around, peppering his students with questions: "Try it in the sun. Why would that make a difference?" A kid guessed: "Because the air is warmer?" Newkirk shouted: "Yes! Yes!"

This spring, Newkirk won the prestigious Chancellor's Bright Lights Award for Distinguished Teaching in Mathematics and Science, one of five handed out citywide. The key to Newkirk's success isn't very mysterious. His methods aren't so different from those of lots of good teachers at S.P.C. and elsewhere: he works extremely hard, and prepares assiduously for class. (He was at the school all hours of the day.) His seemingly endless enthusiasm has made up for his lack of experience. He has the respect of his students and is good at maintaining discipline. And he has made particularly good use of the resources that the partners have provided: professors and computers at Cooper, the Mission Society's 2,000-acre campsite in upstate New York. About Newkirk, Weiss had his own happy litany: "I love his spirit; there's just something about the person that's intangible. I love his willingness to grow. I love that he comes from the background of so many of the kids he teaches. I love that he's successful."

20-20 Vision *Deborah Meier pioneered the idea of 20 students per class, 20 teachers per school.*

Newkirk has done well, however, partly because the job has been made manageable: not too many kids, not too many classes. He's had a principal and colleagues who have supported him daily in his classroom and share his vision for the school. In an enormous school, Newkirk — any good teacher — might have drowned along with the students.

FOR MANY KIDS, THE INDIvidual attention they receive at S.P.C. comes as something of a shock. As Marianne Melendez, a middle-school humanities teacher, put it: "Some of these kids are *used* to being 'lost' in school — that's the norm — so they feel like you're coming down hard on them when you care. No one has ever asked them for anything — expected anything from them — before. So, when you call on them in class, they think they're being singled out. They think you're constantly in their face. Some of these kids have difficulty just expressing themselves because they've had no practice *talking* in class. Their classes before were so big, they were literally never, ever called on."

Reducing class and school size hasn't solved all of S.P.C.'s problems. Several teachers complained about the lack of supplies. But thanks largely to the political clout of its partners, S.P.C. has now secured itself a renovated plant. The school, designed by Carmi Bee, is five floors of colorful exposed pipes, air-conditioning ducts and industrial-size windows. It looks a little like the Pompidou Center on the inside, and the idea behind the design is similar: to reveal the building's infrastructure.

But S.P.C. is unusual in having acquired its own home; citywide there is a moratorium on building or renovating school space. Even with smaller classes, nearly all of the teachers complained of 16-hour days, of having to wear too many hats, which they changed with almost Buster Keaton-like dexterity. As Weiss, the son of a former union organizer, said: "All of us work much harder than we have to. You have to put in long hours. You have to spend your own money. Our obligation isn't the same as a G.M. worker who's making money for the boss. I don't mind if we're exploited a little. We're educating working-class kids."

Still, before big vacations — Christmas or the February break — there was a sense of everyone staggering toward the finish line, exhausted, as after a marathon. And with everyone busy in the classroom, one sick teacher could throw the whole school into chaos. Meg Campbell of the Harvard Outward Bound Project remarked: "I think everyone, including us, just underestimated the extent of the infrastructure that one has to build to have a school function — just getting the pencils ordered! Starting new schools right now in the school reform movement is a very romantic thing to do. And I think some of us got caught up in that romanticism."

Mark described teaching in the city as a continual exercise in "making do." Most new schools, for instance, begin with the bottom few grades, and then add a grade a year, until the school is completed. Weiss, however, made a calculated decision to begin S.P.C. with the sixth and seventh grades, and then tacked on a ninth-grade class as well. The reason, he admits now, was money: high schools are given more money for start-up costs than the city's junior highs. Consequently, Weiss was able to wring a few more badly needed dollars from the Board of Ed.

Starting a junior high and high school simultaneously, however, proved overwhelming, and Weiss came to regret the decision. "It wasn't a sound decision educationally, but at the time, we convinced ourselves that it was. You rationalize because you need the money." This year, Weiss added an eighth grade, but not another high-school class. The 10th grade — last year's 9th — remains, though its students and teachers expressed a strong sense of having been abandoned.

One of the most frequent charges against public school "choice" is that it's elitist and that its self-selection process leaves students who don't have savvy parents in the worst public schools. The middle-school students at S.P.C. are mostly there because their parents sought out the school, but the high-schoolers were mostly randomly assigned to S.P.C. by the Board of Ed. Consequently, they didn't necessarily have any particular interest in the school's emphasis and many of them, having languished for eight years in the city's regular public schools, were ill prepared for high-school level work. Yet for all of the 10th-graders' difficulties, S.P.C. has still given them, by any measure, a better education than they would have received in the city's regular high schools. Their reading scores, for instance, jumped an impressive 10 percent on average in the first year alone, simply because the school is giving them more individual attention.

Naomi Barber, a project director of the Fund for New York City Public Education, finds the charge of elitism particularly frustrating. She explained: "We wanted to

PHOTOGRAPH BY CARRIE BORETZ FOR THE NEW YORK TIMES

start a 'gifted and talented' program at one school in Harlem. And the director said: 'I don't believe in "gifted and talented." ' She thought it was elitist. But it's not as if rich white kids — or even rich black kids — were going there. These were neighborhood kids. All 'gifted and talented' means, really, is academically rigorous. This is something the parents in that community desperately need and want." And indeed this spring, the fund received several thousand applications for a few hundred openings at its "New Vision" schools.

AT OUR LAST INTERVIEW, MARK WEISS TOLD me: "I don't think a story like this should say, 'If he can do it, anyone can.' Some of us can make do with less, but that doesn't mean that everybody can, and then there's a point at which you can't make do." No curriculum, no matter how progressive or traditional, can work in atrociously overcrowded schools, where students are anonymous, teachers have little control over their curricula and principals have virtually no say in how their schools are run. Yet this is precisely the situation in the vast majority of the city's schools. There are some 65,000 teachers in the New York City schools alone. If the system is ever going to work, it's going to have to work for more average talents. There aren't enough superheroes to go around.

Unlike so many other school reforms, which depend on the way they're implemented in the classroom, the effort to achieve smaller schools and smaller classes is both measurable and easily replicable. Even a mediocre teacher is more effective in a class of 20 than in a class of 34. Similarly, there's just a limit to the number of students that even the best teacher can have and not regard them as a mob.

An $8 billion annual education budget may sound like a lot of money, but if you divide that amount by more than a million students, it actually comes to less than $8,000 a year per pupil — about the nationwide average — for a school system with greater-than-average challenges: poverty, violence and a large pool of immigrant students who are unfamiliar with this country's language and culture. The amount will only shrink as enrollments rise and the budget continues to be slashed. None of the money that has been cut as waste from the central Board of Ed has been redirected to the classroom. The savings have gone solely to alleviate the city's larger budget woes.

Meier, for one, is worried. "It scares me when I look at the closing down of after-school programs, youth centers, summer school. That adds to the work we do. Our schools have always relied on the system to provide certain things. The notion of going out and trying to raise private funds to replace that is terrifying. The entire Annenberg challenge has to raise $50 million from private foundations and that doesn't leave a lot left over; and the places that get it will likely be the ones who need it least. We'll end up competing against ourselves." Even the Annenberg "challenge" has not produced the outpouring of philanthropy that many people expected. There is just not enough private money out there to replace government spending entirely.

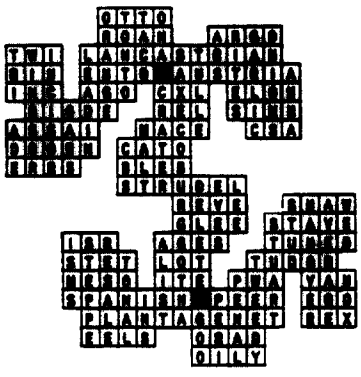
The popular issues in education these days tend to focus on what have been called the "culture wars." It's a testament to Meier and company's seriousness that they have stayed away from such hot-topic debates, which have served only to distract most politicians and education pundits from far more pressing concerns.

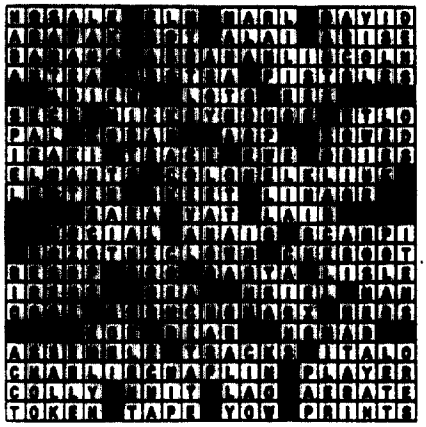
Recently New York City was consumed by a two-year debate over the ill-fated Rainbow Curriculum, a 600-page guide put out by the city's Board of Education that encouraged teachers to teach tolerance of all races, cultures and — here's where it got controversial — sexual orientation. "What most people don't realize," Meier explained with some exasperation, "is that there isn't a teacher in the city who reads those curriculum guides that the Board of Ed puts out — much less a 600-page one! But someone calls you up and so you have to take a position on it." It's not that such issues aren't important. What makes them so popular is that debating them costs, and requires, nothing. But they have virtually no impact on the classroom.

Smaller schools and smaller classes do work, but it remains to be seen whether the city and the country are serious enough about education reform to finance them. The city will eventually have to spend *some* money if it has a prayer of improving its schools: to build more space to relieve the gross overcrowding, to hire more teachers to handle the rise in enrollment, to provide basic supplies. That, or suffer a dysfunctional school system. As Meg Campbell remarked: "There are no economies of scale in education. You can't design a school the way you design a factory. Schools are more like families: having 34 children isn't necessarily the best thing." ■

ANSWERS TO PUZZLES

OF MAY 21, 1995





@news.spc

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@news is a working title for an ongoing letter delivering information about the technology initiative started at School for the Physical City. Soon, we will publish weekly news about new technology, how it affects you and how you can take advantage of it.

Where we are, now
Right now there are three new high-speed Apple computers and a printer in room 313 for faculty use. There is a limited selection of software up there (MS Word, Claris Works, and FirstClass) but we are working on bringing more programs online quickly.

Email is available to dial into from home and from any of the computers that are up and running in the school. Our email system is connected with Expeditionary Learning Outward Bound in Boston and the other schools affiliated with ELOB as well as the internet. To connect to SPCNet from home set your FirstClass software to dial 7269457. If you are outside of Manhattan remember to dial 1 212 before the number. See me if you need FirstClass software on your home computer.

Now you and your students can exchange email with anyone in any other schools connected to ELOB and anyone on the internet. If you have questions about the email system feel free to ask me, drop a note in my box or send me email.

Into the future...
Beginning today, we will put computers in every classroom. These computers will be networked to utilize email, a suite of software, and the file server where you can store files. We are going to put many small printers with the computers. There will also be one laser printer on each floor.

Also starting today is a month-long series of workshops held in room 313 on information technology-related topics. There will be a calendar and a sign-up sheet for each week. Please sign up for the topics that you are interested in. We need at least two people for each workshop or we will be forced to cancel. If you have comments or suggestions about workshop times or topics please send me email or put a note in my mailbox.

Remote Access
Starting in November we will have full remote access. This means that you can connect to SPC's network from anywhere you have a computer and a modem. We have telephone lines installed so that faculty and students can gain access to SPC's network at any time. This differs from email access in that it will allow you to have complete access (programs and files) to the network. Presently only email can be received at home.

Internet Access
SPC, through the Living Textbook project (a two-year multi-school project involving upstate and downstate schools), will soon have a very high-speed connection to the internet. This will allow access to the World Wide Web and many of the other facilities on computer networks around the world at unprecedented speeds.

What is the advantage of having a network?
A network allows you to retrieve files from any computer that is connected to it. If you save a file on a computer on the 5th floor but you want to work on another floor or from home at another computer, you can retrieve it and work with it from anywhere. In other words, it removes geographic boundaries for working with information.

The network also allows people to share files more easily by storing them in group folders.

Finally, the network is backed up, so that if files stored in network accounts are deleted, they can be restored safely and conveniently.

Video Teleconferencing
Like the AT&T commercials that say "Have you seen the future... You will". Well... you will. SPC through the Living Textbook project has the rights to use Apple's QuickTime Video conference system. Computers with cameras and microphones attached to them can bring people in remote parts of the world together in realtime. You will be able to see and speak to people that have the conferencing software and a compatible computer setup anywhere in the world!

Pretty exciting huh? More to come in the weeks to follow.